

REMARKS/ARGUMENTS

Claims 1, 6 and 4 stand rejected under 35 U.S.C. 102(b) as being anticipated by JP 2001-141905 ("JP '905"). For the reasons set forth hereinafter, it is requested that the Examiner reconsider and withdraw this rejection.

The invention of Claim 1 as amended relates to "a titanium oxide complex, comprising: a polymer-based material having an active group; and titanium oxide having a reactive functional group which is capable of reacting with the active group, wherein the active group and the reactive functional group are bonded directly to each other based on a chemical bond".

The invention of Claim 6 as amended relates to a titanium oxide complex, comprising: a hydroxyl group contained in titanium oxide; and a polymer-based material having a functional group which is capable of chemically bonding to the hydroxyl group, wherein the hydroxyl group and the polymer-based material are bonded directly to each other based on a chemical bond".

To provide a titanium oxide complex in which titanium oxide is firmly bonded to a surface of a polymer-based material in a simple manner without deteriorating essential properties of the titanium oxide and the polymer-based material, titanium oxide according to the present invention is characterized in that the titanium oxide and the polymer-based material are bonded to each other based on a chemical bond.

In contrast, JP '905 is silent on a titanium oxide complex in which titanium oxide and a polymer-based material are bonded to each other based on a chemical bond. Specifically:

(A) In the technique according to JP '905, a hardening coat containing titanium oxide particles is formed on a surface of a plastic lens, which corresponds to the polymer-based material. The hardening coat is formed with the use of a coating liquid containing titanium oxide

particles and an organic silicon compound. The coating liquid is applied to the surface of the plastic lens. Then, the coating liquid thus applied is heated so that it becomes hardened (see paragraphs [0006] to [0014]). The Examiner indicates that the heating causes the titanium oxide and the polymer-based material to chemically bond to each other (see page 2 in the Office Action). This is not correct because the heating causes the coat to become hardened but does not cause the titanium oxide and the polymer-based material to chemically bond to each other. Furthermore, in the technique of JP '905, no treatment is performed on the surface of the plastic lens, which corresponds to the polymer-based material. Accordingly, it can be said that the polymer-based material does not contain a reactive functional group. It is apparent therefrom that the titanium oxide and the polymer-based material are not chemically bonded to each other; and

(B) In the technique of JP '905, when an antireflection film is formed on the surface of the hardening coat containing titanium oxide particles, oxygen radical processing (ozone gassing, ozone water treatment, remote plasma treatment) is performed on the surface of the hardening coat beforehand (see paragraph [0015] in JP '905). The oxygen radical processing is performed on the surface of the hardening coat, but not on the surface of the plastic lens, which corresponds to the polymer-based material. Further, the oxygen radical processing is performed in order to improve wetting on the surface of the hardening coat and therefore improve adhesiveness between the hardening coat and the antireflection film. It is obvious to a person skilled in the art that the adhesiveness would not be improved by chemical bonding.

Accordingly, JP '905 does not teach a titanium oxide complex in which titanium oxide and a polymer-based material are bonded to each other based on a chemical bond. It is thus submitted that Claims 1 and 6, as amended herein, are allowable over the teachings of JP '905. Further, Claim 4, which depends from Claim 1, is also allowable over the teachings of JP '905.

As described above, JP '905 does not teach or suggest a technical concept that titanium oxide and a polymer-based material are chemically bonded to each other in order to prevent a

titanium oxide layer formed on a surface of the polymer-based material from peeling off.

Claims 5 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over JP '905 in view of Furozono (Mater. Sci. Letter 22, 2003, 1737-1740) ("Furozono I"). Since claims 5 and 9 depend from claims 1 and 6, respectively, it is submitted that they are allowable over the teachings of JP '905 for the reasons set forth herein with respect to claims 1 and 6, as amended herein.

The Furozono I reference was cited by the Examiner as teaching that titanium oxide particles are not toxic to the body and are non-carcinogenic. Other than this teaching, Furozono I clearly fails to supply the deficiencies of JP '905 with respect to the novel recitations in dependent claims 5 and 9. Accordingly, claims 5 and 9 should be allowable over the cited references.

Claims 3, 5, 8 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over JP '905 in view of Furozono (13th meeting J.S.B.P.) ("Furozono II"). Since claims 3 and 5 are dependent on claim 1, and claims 8 and 9 are dependent on claim 6, it is submitted that they are allowable over the teachings of JP '905 for the reasons set forth herein with respect to the rejection of claims 1 and 6.

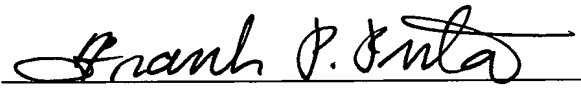
Furozono II was cited by the Examiner as teaching a medical device comprising chemically bound titanium oxide particles to a polymer-based material comprising silicone rubber and silkfibroin. It is noted, however, that Furozono II fails to supply the deficiencies of JP '905 with respect to the novel recitations in dependent claims 3, 5, 8 and 9, and also does not teach a concrete way of chemically bonding the polymer-based material and the titanium oxide to each other. Such a concrete way clearly was not common technical knowledge at the time when the present application was filed. Accordingly, claims 3, 5, 8 and 9 are clearly allowable over the teachings of the cited references.

Claims 2 and 7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over JP '905. Since claims 2 and 7 depend from claims 1 and 6, respectively, it is submitted that they are allowable over the teachings of JP '905 for the reasons set forth herein with respect to the allowability of claims 1 and 6.

In conclusion, it would not be possible for a person skilled in the art to derive the inventions of present Claims 1 to 6 from the descriptions in the cited references. It is submitted, therefore, that the novel recitations of present Claims 1, 6 and all of the dependent claims are clearly allowable over the teachings of the cited references. Prompt and formal allowance of these claims is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 
Frank P. Presta
Reg. No. 19,828

FPP:lcb
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100